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10/599,523	09/29/2006	Sang Jun Youn	4146-00500	1302

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EXAMINER	
DUCHENEAUX, FRANK D	
ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,523	YOUN ET AL.	
	Examiner	Art Unit	
	FRANK D. DUCHENEAUX	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/18/2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) *11-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 September 2009* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/18/2009; 12/9/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's arguments, see pages 4 and 12, filed 9/18/2009, with respect to the objection of the abstract have been fully considered and are persuasive. The objection of the abstract has been withdrawn.

2. Applicant's arguments, see pages 2-3 and 12, filed 9/18/2009, with respect to the objection of the specification have been fully considered and are persuasive. The objection of the specification has been withdrawn.

3. Applicant's arguments, see pages 2-3 and 12, filed 9/18/2009, with respect to the objection of the drawings as set forth in paragraph 8 of the previous action have been fully considered and are persuasive. The objection of the drawings as set forth in said paragraph has been withdrawn.

4. Applicant's arguments, see pages 3 and 12, filed 9/18/2009, with respect to the objection to the drawings as set forth in paragraph 9 of the previous action have been fully considered but they are not persuasive. In at least paragraph 0069 of the amended specification, reference character 41 continues to refer to a "mold." The objection is maintained and repeated below.

Drawings

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "41" has been used to designate both "molding machine" and "mold" (see para 0069 of the amendment to the specification filed 9/18/2009. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference number 44. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. **Claims 1, 5-7 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1).

Regarding claim 1, 5-7 and 10, Sakai teaches preparation of fiber-reinforced thermoplastic molded articles (title) comprising a laminate (column 9, line 47) of a plate material (center layer) essentially consisting of a thermoplastic resin and fibrous reinforcement (thermoplastic

composite material), and a sheet (continuous layer) prepreg obtained by impregnating a unidirectionally (mono-directional structure) arranged fiber with a thermoplastic resin (column 5, lines 9-13), said sheet prepreg is set up on either one or both of the surface (upper and lower surface) and the back of the plate material (column 5, lines 49-50) and said prepreg layer having a reinforcing fiber content of 30 wt. % - and thereby 70 wt. % of a thermoplastic resin (Table 2, prepreg E and Example 8). Sakai also teaches that prescribed numbers of the sheet prepreg are stacked (outermost prepreg sheet serving as a protective layer) in an arbitrary portion on the sheet material and that the sheet material is maintained above the flow temperature (melted) of the thermoplastic resin and then placed in a mold and pressed (adhered) for a short time to carry out foaming, defoaming and cooling and that the resin in the plate material is the same as that of the prepreg (column 5, lines 37-48). Sakai continues to teach a plate material made of a thermoplastic resin with a fibrous reinforcement of a glass fiber (glass fiber-reinforced thermoplastic resin layer) (Table 1, plate material (b) and Example 8). Sakai further teaches suitable thermoplastic resins for the plate material include polypropylene, polyethylene, nylon, PET and polyphenylene sulfide (column 2, lines 40-48); and those resins exemplary for the sheet prepreg include polypropylene, polyethylene, nylon, PET and polyphenylene sulfide (column 3, lines 43-50). Sakai is silent to a continuous reinforcing fiber-impregnated prepreg layer formed in a tape or strand shape by drawing and pressing fibers through an impregnation die supplied with a thermoplastic resin melt.

However, Hsiao teaches core-crush resistant fabric and prepreg fiber reinforced composite sandwich structures (title) comprising a fabric (10) having a plurality of openings (16) by

interweaving warp tow strands (12) and weft tow strands (14) (para 0033, lines 1-3 and figures 1-4), wherein each tow strand is formed from a plurality of continuous filaments and fibers such as those made of high modulus reinforcing fibers such as carbon (natural), fiberglass and aramid (para 0034), and a suitable resin composition for the polymeric matrix resins such as, *inter alia*, polyester and polyamides (para 0039, lines 1-11), said resin applied to the fabric such that the fabric is substantially impregnated and having a resin content of from about 20 to about 60 percent by weight based on the total weight of the prepreg, and the prepreg can further undergo other treatment such as calendaring or compaction to reduce the openness of the prepreg (para 0053). Hsiao continues to teach that prepregs made with the interweaving tow strands greatly reduces the degree or core crush of a fiber reinforced composite structure (para 0068) and also reduces the porosity (para 0074, lines 1-3).

Although Sakai and Hsiao do not disclose "drawing and pressing fibers passed through an impregnation die supplied with a thermoplastic resin melt," it is noted that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process", *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Further, "although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the

prior art product", *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir.1983). See MPEP 2113.

Therefore, absent evidence of criticality regarding the presently claimed process and given that Sakai and Hsiao meet the requirements of the claimed continuous reinforcing fiber-impregnated prepreg layer, Sakai and Hsiao clearly meet the requirements of the present claims.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai and Hsiao references toward fiber-reinforced thermoplastic molded articles having continuous reinforcing fiber-impregnated prepreg layer constructed of high modulus fibers laminated on both sides of a plate material thereby providing the composite structure with increased tensile strength and reduced crush resistance and porosity as in the present invention.

10. **Claims 2 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Funakoshi (US 2003/0161989 A1).

Regarding claims 2 and 8, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Sakai also teaches that the content of fibrous reinforcement in the plate material is from 30 to 70 % by weight and in view of reinforcing effects alone higher amounts are better, but a content exceeding 70 % by weight leads to

flowability problems, while in view of flowability a content of 50 % by weight or less is preferred (column 3, lines 37-42). Sakai is silent to fibers with an average length of 1-30 mm.

However, Funakoshi teaches a lightweight fiber-reinforced thermoplastic resin molding (title) comprising fibers of an average length of 2 mm to about 10 mm (para 0040) and that tensile and bending strength tend to be greater as the length of reinforcing fibers increases (para 0039).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Funakoshi references to provide a fiber-reinforced thermoplastic plate material having fibers in a percent weight as presently claimed and a length as presently claimed towards fiber-reinforced thermoplastic molded articles, wherein a plate material has an amount of fiber content sufficient to provide reinforcing characteristics while maintaining adequate flowability, said fibers additionally providing tensile and bending strengths commensurate with the application for which the articles are to used as in the present invention.

11. **Claims 3 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Nagayama et al. (US 6749934).

Regarding claims 3 and 9, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Hsiao also teaches well known flow control agents, albeit added to the resins of the prepreg layer, to adjust the viscoelasticity of a resin composition

such as inorganic particles (para 0041) such as, *inter alia*, calcium carbonate (para 0043). Sakai and Hsiao are silent to a center layer comprising 15 to 30 % by weight of inorganic filler.

However, Nagayama teaches an FRP molded article and method for producing the same (title), comprising a mixture of thermoplastic resin and reinforcing fibers (abstract) and a filler such as needle-like calcium carbonate (column 7, lines 43-47), wherein the needle-like filler content is 5 to 20 wt. % (column 8, lines 23-26). Nagayama also teaches a fine filler, especially a needle-like filler, inhibits local molding shrinkage and irregular stiffness, which mitigates warping (column 8, line 67 and column 9, lines 1-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Nagayama references to provide the plate material with an inorganic filler material in an amount as presently claimed towards a fiber-reinforced thermoplastic molded article, wherein the viscosity of the resinous plate material can be controlled for processing of the fiber-reinforced thermoplastic molded article, and which is less susceptible to local shrinkage of the mold and irregular stiffness and provides a molded article with diminished warping and thereby an article with improved aesthetic appearance as in the present invention.

12. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Bassett et al. (EP 0945253 A2).

Regarding claim 4, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Hsiao also teaches well known flow control agents, albeit added to the resins of the prepreg layer, to adjust the viscoelasticity of a resin composition such as organic particles (para 0041) such as, *inter alia*, cellulose (para 0043). Sakai and Hsiao are silent to a center layer comprising 20-40 % by weight of wood flour and chaff.

However, Bassett teaches a filled composite material (title) comprising a polyolefin, glass fibers and filler (abstract), wherein said filler is a wood flour (para 0019, lines 1-2) with a content of 20 to about 40 % by weight of the composite (para 0036, line 3). Bassett also teaches that wood flour can be used for cost reduction of the composite materials.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Bassett references to provide the plate material with an organic filler material in an amount as presently claimed towards a fiber-reinforced thermoplastic molded article, wherein the viscosity of the resinous plate material can be controlled for processing of the fiber-reinforced thermoplastic molded article, and which is less expensive to produce as in the present invention.

Response to Arguments

13. Applicant's arguments, see pages 12-17, filed 9/18/2009, with respect to the rejection of claim 1 over Sakai et al under 35 U.S.C. 102(b) have been considered but are moot in view of the new ground(s) of rejection. The examiner's complete response follows:

The applicants argue that Sakai fails to disclose each and every element of amended claim 1; specifically, Sakai fails to disclose that amended portion of claim 1 reciting "the continuous reinforcing...with a thermoplastic resin melt" since Sakai discloses preparing a prepreg sheet in a manner different from that of the present application. The applicants also argue that none of the secondary references used in combination with Sakai disclose the amended portion of independent claim 1 nor would it be obvious to one of ordinary skill in the art.

The applicants' attention is directed to the rejection of claim 1 over the original Sakai reference in view of Hsiao, wherein Sakai teaches all the limitations of amended claim 1 except for those portions amended. However, it is noted that the analogous reference of Hsiao et al. teaches a continuous reinforcing fiber-impregnated prepreg layer composed of interwoven warp and weft tow strands, wherein each tow strand is formed from a plurality of continuous filaments and fibers such as those made of high modulus reinforcing fibers and a resin composition as presently claimed.

The applicants also assert the present invention provides a substantially complete impregnated prepreg layer while forming continuous fiber bundles in a length direction via the product-by-

process limitations of the amended portions, which endows the present invention with improved mechanical properties, permits the prepreg layer to be woven or laminated freely (free arrangement) to a center layer and shortens the time for prepreg production. The applicants allege that the disclosure of Sakai fails to disclose the process and the production and mechanical benefits.

The applicants' attention is directed to the rejection of current claim 1 over the original Sakai reference in view of Hsiao, wherein Hsiao recites, *inter alia*, that "said resin applied to the fabric such that the fabric is substantially impregnated." It is noted that, while the combined references do not teach the explicit methodology as presently claimed and/or disclosed, given that the references teach a prepreg layer identical to that presently claimed, it is clear that the prepreg layer as taught by the combined references would provide mechanical and application-based advantages of the present invention.

The applicants further assert, by pointing to the examples and comparative examples of the present disclosure, that the claimed invention is distinguished over the prior art due to the inclusion of amended portion of current claim 1 and the resulting enhanced properties thereof for reasons demonstrated by comparing the associated examples.

The examiner notes that the Sakai and Hsiao references teach, *inter alia*, the strand configuration and the substantially complete impregnation as presently claimed and not the structure embodied by the comparative example, and while the present invention may distinguish over the

comparative examples set forth in the present disclosure, clearly it does not distinguish over the combined teachings of the Sakai reference and the analogous Hsiao reference as demonstrated above.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK D. DUCHENEAUX whose telephone number is (571)270-7053. The examiner can normally be reached on M-Th, 7:30 A.M. - 5:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie E. Shosho can be reached on (571)272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/F. D. D./
Examiner, Art Unit 1794

/Callie E. Shosho/
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